these difficulties, however, the storm tracks and other meteorological conditions have been very carefully investigated by eminent Japanese meteorologists. Japan[1] has just established a new weather service in Korea and Manchuria, and is said to be intending to extend the service to southern China. These are all for immediate practical daily forecasts; but the exploration of the free upper atmosphere by balloons and kites has not been touched. This vast upper ocean of atmosphere, the study of which is exceedingly important for further advances in the physics of the atmosphere, as well as in the prediction of the weather, must remain entirely unknown to Japanese meteorologists until they are able to investigate it.

Japanese meteorologists do not generally possess all the expensive instruments and apparatus that are found in the United States and Europe. In the whole of Japan there is probably not a complete set of modern apparatus for the study of atmospheric electricity, such as those of Elster and Geitel, Ebert, Benndorf, or Gerdien. Japanese physicists and meteorologists have relied on their own hands and brains, but we have now come to the age when international cooperation in science is progressing rapidly and our scientists should be provided with laboratories and observatories containing powerful instruments and apparatus, It is sad, indeed, to hear from Japanese meteorologists that they have no hope of establishing an aero-physical observatory similar to those mentioned above.

I have been asked if I can induce some worthy American patron of science, or some institution, to establish an aero-physical observatory in Japan, or somewhere on the other side of the globe. What we should want at first would not necessarily be a great observatory, such as Mount Weather, but a small one, or several such, where we can observe with kites the conditions of the upper atmosphere, and can also study the atmospheric electrical phenomena by using the Ebert, Elster and Geitel, and Benndorf apparatus. Such work is entirely new in Japan, but good physical assistants and materials can be obtained at small cost. It will require only a few thousand dollars to establish such an observatory in Japan.

All Americans remember gratefully that the Smithsonian Institution, of Washington, which has done wonderful service for the increase and diffusion of scientific knowledge in America, was founded by a foreigner, an Englishman, James Smithson, in the beginning of the nineteenth century. May not Japan receive similar encouragement from foreign countries or institutions? Scientific research is becoming more and more international and cooperative; it soars far above the differences of race and national policy. The results of the meteorological investigations that are carried on in an aero-physical observatory in Japan will be directly beneficial to the whole human race as well as to that country. The world's meteorology will receive far greater benefits indirectly than will Japan directly. Our atmosphere must be studied as a unit. When the atmospheric conditions in the upper and lower strata become thoroughly known over America, Europe, and Asia, then, and only then, can meteorologists establish the true theories of cyclones, anticyclones, floods, and droughts on a firm observational basis. We must remember, however, that at present the atmospheric conditions in the upper atmosphere over the Eastern Hemisphere of the globe are entirely unknown, and the final solution of our complex aero-physical and dynamical problem is still far away.

All nations send their naval and merchant vessels to Japanese ports where we do our best to forewarn them of dangerous storms. A storm-warning service blesses all nations alike. Its signals represent an international cooperation for the benefit of all mankind.

For these reasons I appeal confidently to the American patrons of science for the funds necessary to establish a modern aero-physical observatory in Japan.

[1] For the condition of the Japanese weather service, see "Recent advances in meteorology and meteorological service in Japan." Popular Science Monthly, February, 1906.

WEATHER BUREAU MEN AS EDUCATORS.

Mr. Albert Ashenberger, Observer, Mobile, Ala., under date of January 20, reports that he delivered a lecture on weather forecasting before the faculty and students of Springhill College, Springhill, Ala. Special reference was made to the methods of long-range forecasters.

Mr. S. S. Bassler, Local Forecaster, Cincinnati, Ohio, reports that on December 15, 1905, he read a paper on "Weather proverbs and prophets" before the Ladies' Literary Club of Norwood, Ohio.

Mr. Al. Brand, Observer, Evansville, Ind., reports that about 30 members of the Men's Club of St. Paul's Church visited the Weather Bureau office on the evening of January 18, and listened to a talk by the observer on the instruments and work of the Bureau.

Mr. Frederick W. Brist, in charge of the office at Thomasville, Ga., under date of January 23, reports that on the 17th a class in physical geography from the Thomasville High School visited the office, and that its members were instructed in the construction and use of the various instruments and in the method of making forecasts from the daily weather maps.

Mr. Allen Buell, Observer, San Antonio, Tex., under date of January 31, 1906, reports that at various times during the school year he has given extemporary lectures to the pupils of the schools on meteorology in general and the methods and work of the Weather Bureau. Such lectures have been given in most of the higher schools in the city.

Mr. Norman B. Conger, Inspector, Detroit, Mich., under date of January 12, 1906, reports that the class in physical geography in the High School, 35 in number, visited the Weather Bureau office and listened to the usual informal talk on the instruments and work of the Weather Bureau.

Prof. H. J. Cox, Chicago, Ill., under date of January 16, 1906, reports that a popular lecture on "Weather and weather forecasting," illustrated with lantern slides, was given in Chicago as follows:

November 3, West End Woman's Club; November 16, Hyde Park Men's Club; November 21, Chicago Woman's Aid; December 1, Neighborhood Settlement, in Ogden Park Hall.

The Chicago Press Club visited the office November 14; an informal talk was given on instruments and forecasts.

Classes from schools have visited the office as follows:

October 19, Waller High School; October 20, Chicago Normal School; October 21, West Division High School; December 4, Oxford Preparatory School for Boys; December 8, Chicago Normal School.

Professor Cox reports, under date of January 30, that on January 26 he lectured at Michigan Military Academy, Orchard Lake, Mich., to an audience composed of faculty, students, and a few invited guests.

Mr. W. H. Fallon, Observer, Grand Haven, Mich., states that the class in physics of the local high school visited the office in sections on the 11th and 18th of December; the students were given instruction relative to the theory and use of the various meteorological instruments, the construction of weather maps, and other Weather Bureau work.

Mr. D. S. Landis, Assistant Observer, Fort Worth, Tex., under date of February 21, reports that on January 10 the class in physical geography from the Fort Worth High School, accompanied by the science teacher, visited the office, and was shown how the recording instruments work and how maps are made; also by a series of maps the development and progress of cyclones and anticyclones was followed. On January 23 Mr. Landis gave an illustrated talk on the weather, lasting half an hour, to the senior class of the Cleberne, Tex., High School.

Mr. G. A. Loveland, Section Director, Lincoln, Nebr., reports that on January 20 he delivered an address before the meeting of the Nebraska Association of Mutual Insurance Companies on "Electricity in the atmosphere."

Mr. H. W. Richardson, Local Forecaster, Duluth, Minn., reports under date of January 11 that about 25 members of the senior class of the State Normal School, Superior, Wis., visited the office, and were addressed on the subject of weather forecasting and the value of the Weather Bureau.

Mr. W. J. A. Schoppe, Assistant Observer, Iola, Kans., under date of January 29, reports that on the 17th and 18th the class in physical geography, and on the 22d the physics class of the Iola High School visited the Weather Bureau office, where the instruments, the weather map, and the general work of the Bureau were explained to them.

Mr. J. P. Slaughter, Section Director, Oklahoma, Okla., under date of January 7 reports that after moving into new quarters he will confer with the president of Oklahoma University in regard to the advisability of a course of instruction in meteorology.

Mr. J. Warren Smith, Section Director, Columbus, Ohio, under date of February 9, 1906, reports the following educational work done at that station during the month of January, 1906: January 4, regular lectures were begun at the Ohio State University at 4 p. m.; they are to be continued on Tuesdays and Thursdays at the same hour during the winter term of thirteen weeks. January 12, an illustrated lecture was delivered before the Boys' Club of the South Congregational Church at 7:30 p. m. January 25, his Ohio State University class of 40 men visited the Weather Bureau office and were given a lecture upon the instruments and general work. On January 26, 30, and 31 classes in physical geography of about 30 members each, from different city high schools, visited the office and were given a lecture on the instruments and general work of the Bureau.

Mr. P. H. Smyth, Local Forecaster, Cairo, Ill., reports that the class in physical geography of the Cairo High School visited the local office on January 10, 1906, and were given instruction in the use of instruments, preparation of maps, and methods of forecasting.

Mr. James H. Spencer, Observer, Dubuque, Iowa, under date of January 30, reports that on January 23 he gave an illustrated address on the weather map before the Fellowship Club of St. John's Episcopal Church of that city.

Mr. Chas. Stewart, Observer, Spokane, Wash., reports that on December 23, 1905, 20 pupils from Holmes Grammar School, accompanied by their teacher, visited the Weather Bureau office and had the meteorological instruments exhibited and explained to them. Similar visits were made on January 8 and 17, 1906, by parties from the class in physical geography of the Spokane High School.

Mr. W. P. Stewart, Assistant Observer, in charge of the office at Escanaba, Mich., under date of January 21, reports that on the 19th he delivered a lecture on the work of the Weather Bureau before the English Club of that city.

Mr. A. H. Thiessen, Section Director, Raleigh N. C., under date of January 29, reports that on January 25 the class in physics of the Baptist University at Raleigh visited the Weather Bureau office; that he gave them an informal lecture on instruments and the method of forecasting the weather; particular attention was given to the barometer.

Mr. J. R. Weeks, Observer, Binghamton, N. Y., under date of January 27, 1906, reports the delivery of the following lectures: November 16, 1905, at Public Library Lecture Hall, on "The weather in general;" November 17, 1905, at Western Presbyterian Church, to the Men's Club on "The weather;" November 23, 1905, at the Public Library, on "Special types of storms;" December 7, 1905, at the Public Library, on "Climate;" January 8 and 10, 1906, an informal talk to the physiography class of Binghamton High School, in two divisions, on "Instruments and work of the Bureau;" January 11, 1906, at First Presbyterian Church, to the Men's Club, on "Storms and weather forecasting." The formal lectures were all illustrated with stereopticon views.

Mr. Edward L. Wells, Observer, Boise, Idaho, reports that on January 19, the commercial geography class from the City High School, accompanied by their instructor, visited the Weather Bureau office, and that he gave them an informal talk upon the instruments, observations, and the principles underlying forecasting.

Mr. R. F. Young, Section Director, Helena, Mont., reports that he has begun a series of lessons to the physical geography class in the Helena High School. The course of instruction has been planned with special reference to the construction of the weather map and its use in forecasting weather and temperature.

TORNADOES—HAILSTONES—THUNDERCLOUDS.

Under date of June 12, 1905, Dr. J. P. Gibson, of Salisbury, Wake County, N. C., writes as follows:

TORNADO WINDS.

On April 5 last I had occasion to observe a severe tornado that struck this place about 4 p. m. on that day. It came from the southwest and lasted about seven or eight minutes, and the path of destruction was between 200 yards and three-fourths of a mile wide and about six miles in length. On the same evening there was a similar one about 25 miles west, at Mooresville, Iredell County, N. C., at about the same hour. A great many houses were partially and several totally demolished.

What I wish to call your attention to is as follows: There were two auditoriums—one 40 by 200 feet, the other 30 by 80 feet—and a church, 40 by 75 feet, in its path. The larger auditorium collapsed and lay flat on the ground; the end of the building facing the direction from which the storm came was in greater part blown inward and the other walls thrown outward. The large roof was lying flat between the walls on the seats and the ground; the building had no floor but the ground. The smaller auditorium had its roof entirely blown away toward the northwest, the end that fronted the south was blown in, and the other walls bulged outward, but did not fall to the ground. The third building or church utterly collapsed, the greater portion of the roof being blown over a house 35 feet high, across the street, fronted by trees 45 feet high. The tops of the latter were grazed and some of the highest branches torn away. Débris of the roof began to reach the ground about 50 yards away, and shingles were found 600 yards distant. The wall fronting the storm was blown inward and the other walls fell outward; the floor was moved 6 or 8 feet off its supports, which were brick pillars 6 feet in height.